

Scientific Note

RANGE EXTENSION OF *PSENEO PUNCTATUS* FOX AND NOTES ON PREDATION OF AN INTRODUCED SHARPSHOOTER, *HOMALODISCA COAGULATA* (SAY)

The tribe Psenini Bohart & Menke (Hymenoptera: Sphecidae: Pemphredoninae) was described in 1976 (Bohart, R. M. & S. Menke 1976. Sphecid wasps of the world, a generic revision, University of California Press, Berkeley, California, USA). It is a poorly understood group, and basic biologies are unknown. Psenini are small, slender, delicately constructed wasps that most commonly occur in association with damp shady situations. Some genera and species within the tribe are located in southern California (R. M. Bohart, personal communication). However, only one species of *Pseneo* has been recorded in California, *Pseneo longiventris* (Cameron) (van Lith, J. P. 1975. Neotropical species of *Pseneo* and *Pseneo* [Hymenoptera: Sphecidae: Psenini]. Tijdeschrift voor Entomologie. 118: 1–41).

We became aware of a large aggregate of digging wasps on the grounds of the University of California Riverside in August 1998. Many of the nests seemed to be completed, closed, nests, but the majority had entrances open with provisioning occurring. Many nests were so close together that the mounds at the entrances were overlapping. The wasps appeared to have little difficulty finding their own nests, and no aggressiveness was observed between neighboring females. We counted 181 nesting sites within 30 plant propagation trays (45 × 45 × 10 cm) filled with U. C. mix #3 (Matkin, O. A. & P. A. Chandler. 1957. The UC soil type mixes. U. C. Berkeley, California Agriculture Experiment Station, Manual 23) to a depth of 6 cm. All trays were located within a 10 m² area in an open lathhouse on raised benches. The soil-filled trays were being temporarily stored prior to being used for seedling establishment in unrelated experiments. Nesting wasps were observed wherever the soil was exposed in any of the trays. We observed wasps active in 53 (29%) of the observed 181 nesting sites.

Specimens were collected and identified as *P. punctatus* Fox, a species found from North Dakota to southern Mexico. Features of the male, including the species-specific details of the antenna and genital capsule, clearly match those of typical *P. punctatus*. However, the Riverside wasps have extensive reddish coloration on the legs in both sexes; in van Lith's (1975) key they run to *P. carolina*, a southeastern U.S. species described exclusively from females (also originally described as a subspecies of *P. punctatus*). Specimens of putative male *P. carolina* from Texas raise questions as to the validity of the taxon, as they are nearly identical to the California specimens of *punctatus* (A. Finnamore, personal communication), and the resultant distribution of "*carolina*" would apparently bisect the known distribution of *punctatus*. Our suspicion is that *P. punctatus* is a species with a large distribution and substantial geographic variation, which has not yet been sampled adequately to resolve the limits of the various forms, including *P. carolina*, which was probably inappropriately elevated to species status by van Lith. *Pseneo punctatus* represents the second *Pseneo* species collected in California (Bohart, personal communication; Krombein, K. V. 1979. Superfamily

Sphecoidea. pp. 1573–1740. In Krombein, K. V., P. D. Hurd, Jr., D. R. Smith & B. D. Burks [eds.]. Catalogue of Hymenoptera of America North of Mexico. 2: 1119–2209. Smithsonian Institution Press, Washington, D.C., USA). Voucher specimens are located at the University of California Riverside, Entomology Research Museum.

During our observations of *P. punctatus* over a period of several days we noted the following behaviors. Nest excavation was observed only in the afternoon. Nests were excavated with the mandibles and front legs. Soil was loosened by the mandibles, formed into a small uneven clump, and pushed backward beneath the body with the front legs. Usually the clumps of soil are thrown clear of the body by the initial thrust of the front legs. If not, the soil clumps are thrown clear of the body with the assistance of the middle and hind legs. The female typically digs the burrow vertically straight down. As the wasp digs deeper, small clumps of soil clog the nest entrance and hide the digging female. Occasionally, as soil accumulates near the nest entrance, the wasp would back up and clear the entrance hole. During mound building, most wasps would occasionally tamp the soil down with their abdomens, presumably to prevent the nest entrance from becoming obstructed with excavated soil. Nest entrances were 6.50 ± 2.35 mm (mean \pm SD, $n = 16$, range 5–12 mm) in diameter, and were sometimes hidden under fallen leaves or other debris.

Over a period of hours to days, females repeatedly provisioned their nests with large Homopteran sharpshooters (Cicadellidae). When the nest was fully provisioned, the female would repeatedly emerge and re-enter the nest entrance dragging clumps of soil with her forelegs back into the hole each time she entered. When the upper portion of the burrow was filled with soil, the female would walk over the top of the mound repeatedly scraping the surface with her forelegs and tapping it with her abdomen. At this point, it was no longer possible to discern that a burrow was present.

What was of particular interest to us was that *P. punctatus* was using both the native smoketree sharpshooter, *Homalodisca lacerta* (Fowler) (Homoptera: Cicadellidae), and the introduced glassywinged sharpshooter, *Homalodisca coagulata* (Say), as prey. *Homalodisca coagulata* became established in California during 1989–1990 (Sorenson, J. T. & R. J. Gill. 1990. Pan-Pacific Entomol., 72: 160–161). It has now been established in 11 counties and on numerous host plants including citrus, grapes, oleander and a wide variety of ornamental landscape and native plants. Currently, *H. coagulata* is the principle vector of Pierce's disease of grapevines in the southern portion of California (Costa, H. S., M. J. Blua, J. A. Bethke, & R. A. Redak. 2000. [In press]. HortScience University of California, Office of the President. 2000. Report of the Pierce's Disease Research and Emergency Task Force). The vast majority of prey we observed were *H. coagulata* adults. *Pseneo punctatus*' natural prey most likely is *H. lacerta*, and we believe it has expanded its usable hosts to include the recently introduced sharpshooter.

When several of the nests were excavated, we usually observed three cells per nest, but it was difficult at times to accurately determine how many cells each nest contained. Many cells contained sharpshooters that were old, decayed and untouched. We could not determine if they were abandoned or if they were part of the normal provisioning of the nest and simply unused. Although the number of sharpshooters per cell varied, they commonly contained about 4 adults. In some

cells, we observed eggs deposited between the front pair of coxae on the venter of a single sharpshooter. They were oblong, white, and slender, and on average they were 2.29 ± 0.35 mm long (mean \pm SD, $n = 5$, range 3.0–4.6).

Wasp cocoons were also observed. On average cocoons were ellipsoidal, 14.50 ± 1.34 mm in length, and 5.79 ± 0.70 mm in width (mean \pm SD, $n = 14$, range 13–17, and 5–7 respectively). Cocoons were covered with small pieces of plant material and sharpshooter fragments (mostly head capsules and wings).

Occasionally, we observed wasps emerging from the soil as adults. Emergence holes were a mean of 3.64 ± 0.50 mm in diameter (mean \pm SD, $n = 11$, range 3–4) and unlike active nest entrances, they were not marked by any debris or mounds of dirt.

Specimens Examined.—CALIFORNIA. RIVERSIDE Co.: Riverside, University of California campus, lath house, 21 Aug 1998, Kathleen A. Campbell, swept, 2 females, deposited: University of California, Riverside, Entomology Research Museum; same loc., 25 Aug 1998, reared from larva, 1 female, reared from pupae, (6 males, 2 females), deposited: University of California, Riverside, Entomology Research Museum; same loc., 27 Aug 1998, reared from larva, 1 female, deposited: University of California, Riverside, Entomology Research Museum; Riverside, University of California campus, undeveloped area 2 meters west of the lath house, 11 Sept 1998, James A. Bethke, swept from eucalyptus, (1 male, 3 females), deposited: University of California, Riverside, Entomology Research Museum; Riverside, University of California campus, solid bin adjacent to Entomology Annex I, swept, 1 female, deposited: University of California, Riverside, Entomology Research Museum.

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